TGL2205–SM

2 – 6 GHz 100 Watt VPIN Limiter

Product Overview

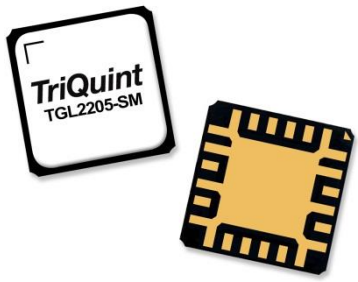
The Qorvo TGL2205–SM is a high power, wideband GaAs VPIN limiter capable of protecting sensitive receive channel components against high power incident signals. The TGL2205–SM does not require DC bias, and achieves a low insertion loss all in a small form factor. These features allow for simple integration with minimal impact to system performance.

The TGL2205–SM operates from 2–6 GHz with low insertion loss of less than 0.6 dB. It can limit up to 100 W incident pulsed-power with a low flat leakage of less than 16.5 dBm.

The TGL2205–SM is offered as a packaged limiter, and is well suited for both commercial and defense related applications.

Lead-free and RoHS compliant.

Evaluation boards available on request.

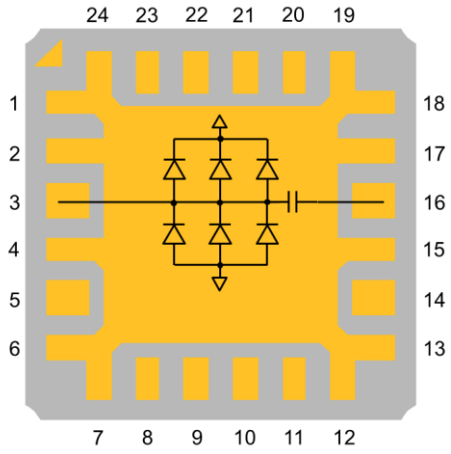


24 Pad 4 x 4 mm QFN Package

Key Features

- Frequency Range: 2 to 6 GHz
- Insertion Loss: < 0.6 dB
- Peak Power Handling: 100 W
- Flat Leakage: < 16.5 dBm
- Spike Leakage < 17 dBm
- Passive (no DC bias required)
- Integrated DC Blocks on the output
- Recovery time < 115 ns
- Package Dimensions: 4.00 x 4.00 x 1.47 mm

Functional Block Diagram



Top View

Applications

- Receive Chain Protection
- Commercial and Military Radar

Ordering Information

Part	ECCN	Description
TGL2205–SM	EAR99	S and C-Band 100W VPIN Limiter

Absolute Maximum Ratings

Parameter	Rating
Incident Power, CW or Pulsed, 50 Ω, 25 °C	100 W
Incident Power, CW or Pulsed, 50 Ω, 85 °C	50 W
Mounting Temperature (30 s max)	260 °C
Storage Temperature	-40 to 150 °C

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Passive – No Bias				

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

Electrical Specifications

Parameter	Conditions (1)	Min	Typ	Max	Units
Operational Frequency Range		2		6	GHz
Insertion Loss			< 0.6		dB
Input Return Loss			12		dB
Output Return Loss			12		dB
Flat Leakage Power at P_{IN} > 30 dBm			< 16.5		dBm
Pulse Recovery Time			< 115		ns
Spike Leakage			< 17		dBm
Insertion Loss Temperature Coefficient			0.003		dB/ °C

Notes:
1. Test conditions unless otherwise noted: Temp = +25 °C, Tuned EVB Results.

Thermal and Reliability Information

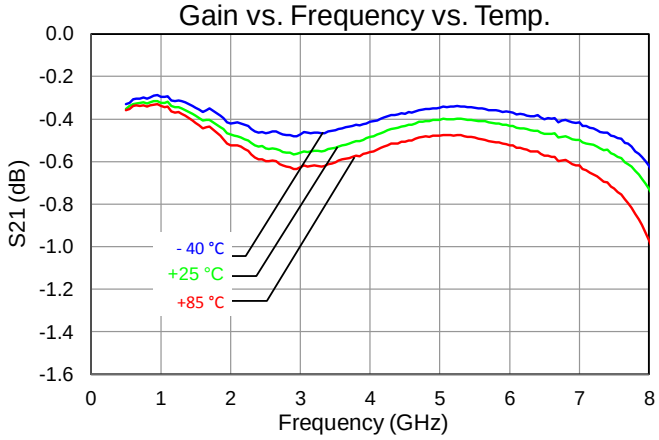
Parameter	Test Conditions	Value	Units
Incident Power (RF Operational Life Test (1))	4.5 GHz, CW, 50 Ω, 25 °C	31	W
	4.5 GHz, Pulsed, PW=10 µs, DC=10%, 50 Ω, 25 °C	100	W

Notes:
1. Test terminated after 168 hours. Insertion Loss remained ≤ 1 dB for device under test.

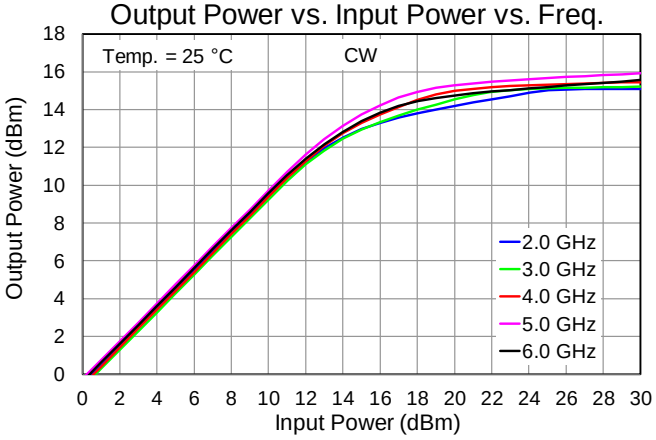
Performance Plots – Small & Large Signal

Test conditions unless otherwise noted: CW Power, Temp.=+25 °C, Tuned EVB Performance

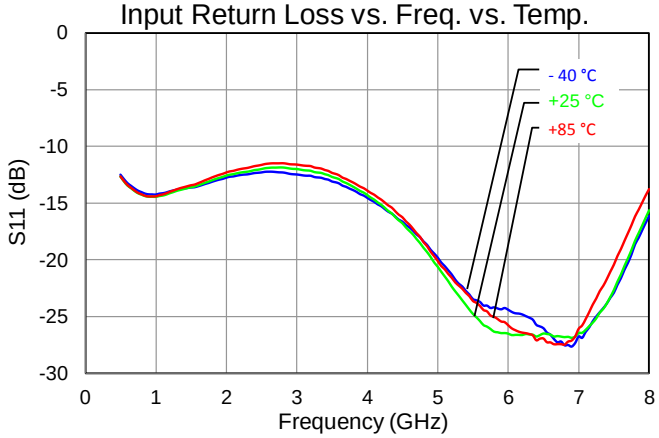
Gain vs. Frequency vs. Temp.



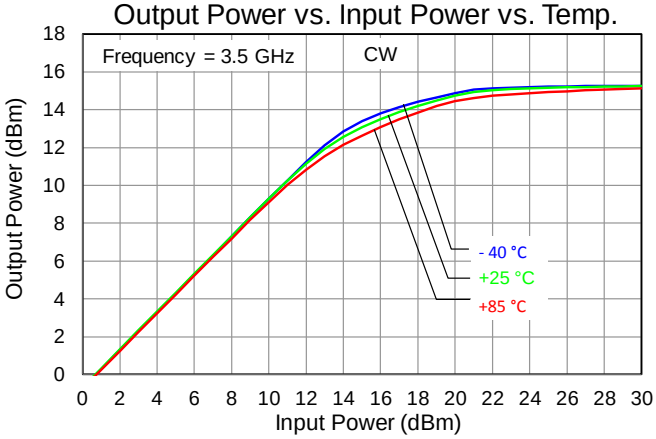
Output Power vs. Input Power vs. Freq.



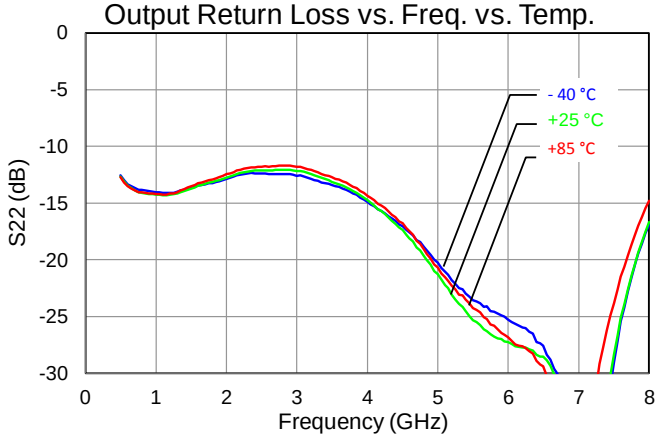
Input Return Loss vs. Freq. vs. Temp.



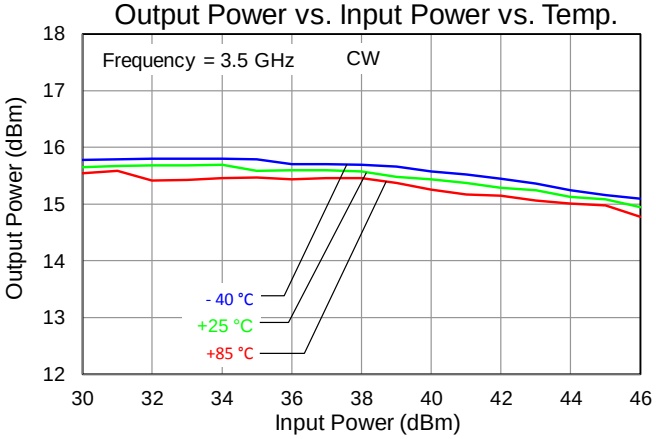
Output Power vs. Input Power vs. Temp.



Output Return Loss vs. Freq. vs. Temp.

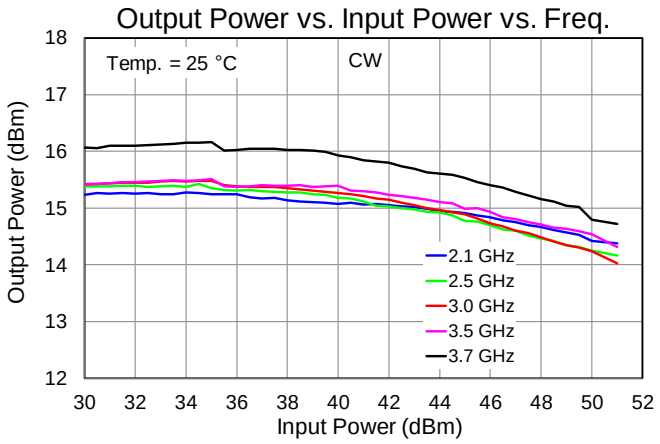


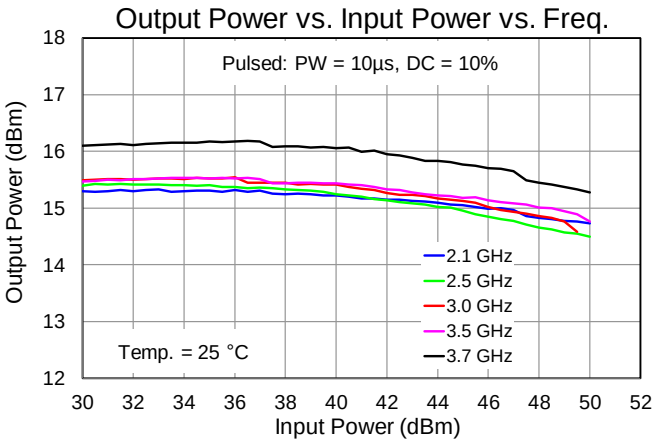
Output Power vs. Input Power vs. Temp.

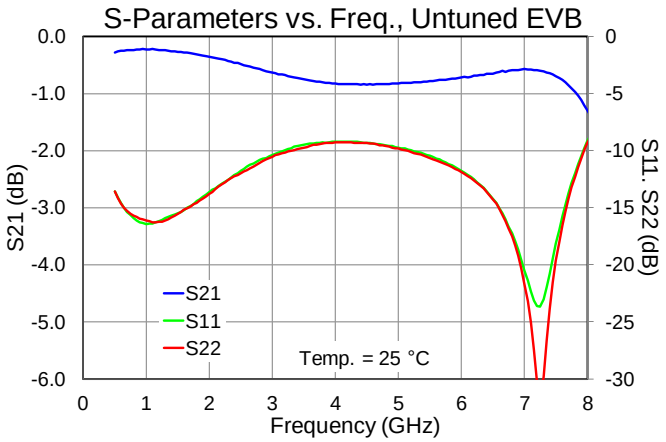


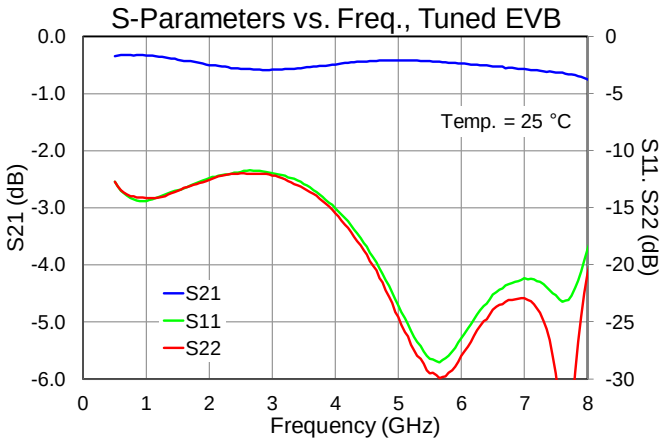
Performance Plots – Small & Large Signal

Test conditions unless otherwise noted: CW power, Temp.=+25 °C, Tuned EVB Performance

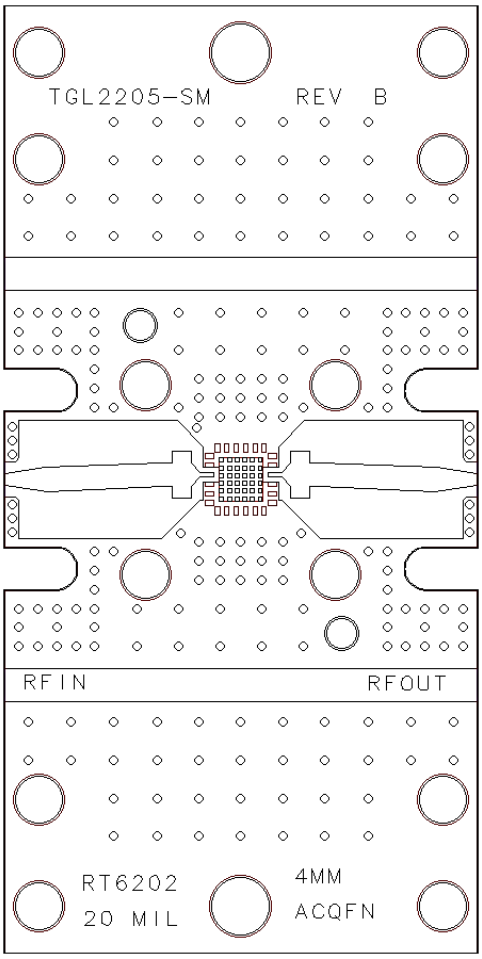


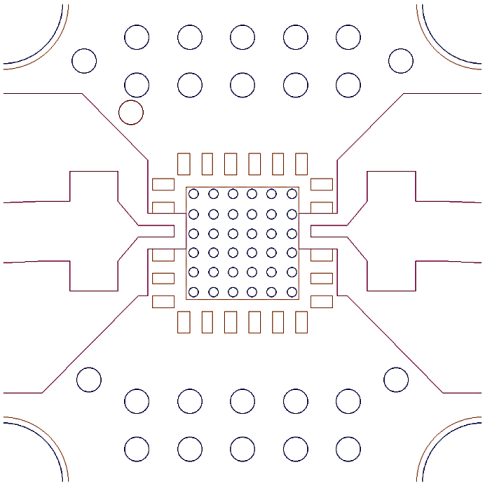






Evaluation Board (EVB) & Mounting Detail



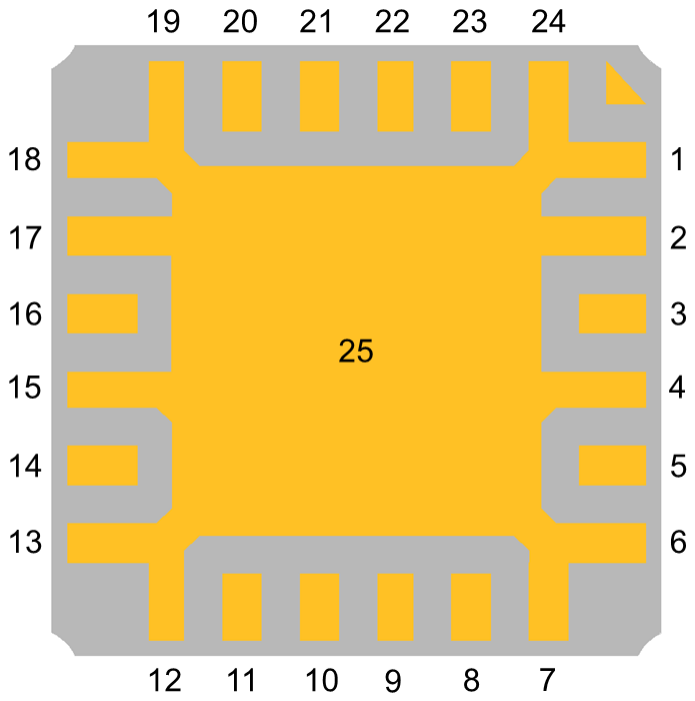


Mounting Detail

Notes:

1. RF layer is 0.020” thick Rogers RO6202, εr = 2.94. Metal layers are 1-oz copper. Microstrip 50 Ω line width is 0.050”. The microstrip line taper at the connector interface is optimized for the Southwest Microwave end-launch connector 1092-02A-5.
2. The pad pattern shown has been developed and tested for optimized assembly at Qorvo. The PCB land pattern has been developed to accommodate lead and package tolerances. Since surface mount processes vary from company to company, careful process development is recommended.
3. Ground / thermal vias under the DUT are critical for the proper performance of this device.
4. The EVB shown herein utilizes copper filled vias (8 mil diameter) under the DUT to maximize heat transfer away from the DUT under large signal conditions.
5. Thermal dissipation is low for normal non-limiting operation.

Pad Configuration and Description

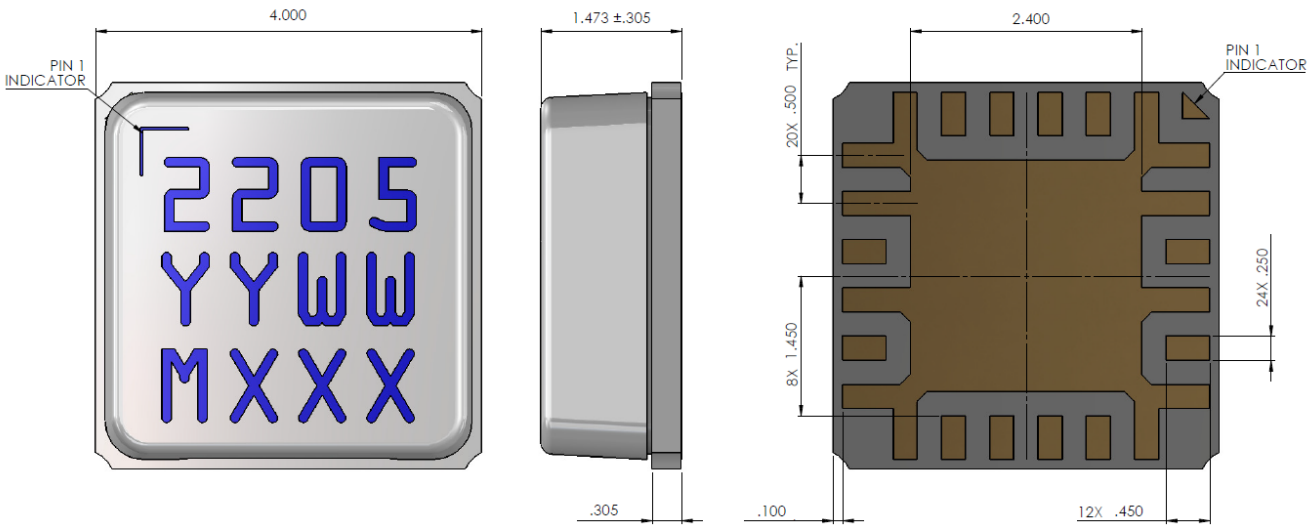


Bottom View

Pad No.	Label	Description
1,2,4,6,7,12,13, 15,17-19,24,25	GND	On PCB, multiple copper-filled vias should be employed under the center pad to minimize inductance and thermal resistance. See page 5 for suggested mounting configuration
3	RF Input	RF Input, matched to 50 Ohms, not DC blocked
5,8-11,14,20-23	NC	No connection; may be grounded if desired
16	RF Output	RF Output, matched to 50 Ohms, DC blocked

NOTE: The RF Input and RF Output ports are not interchangeable.

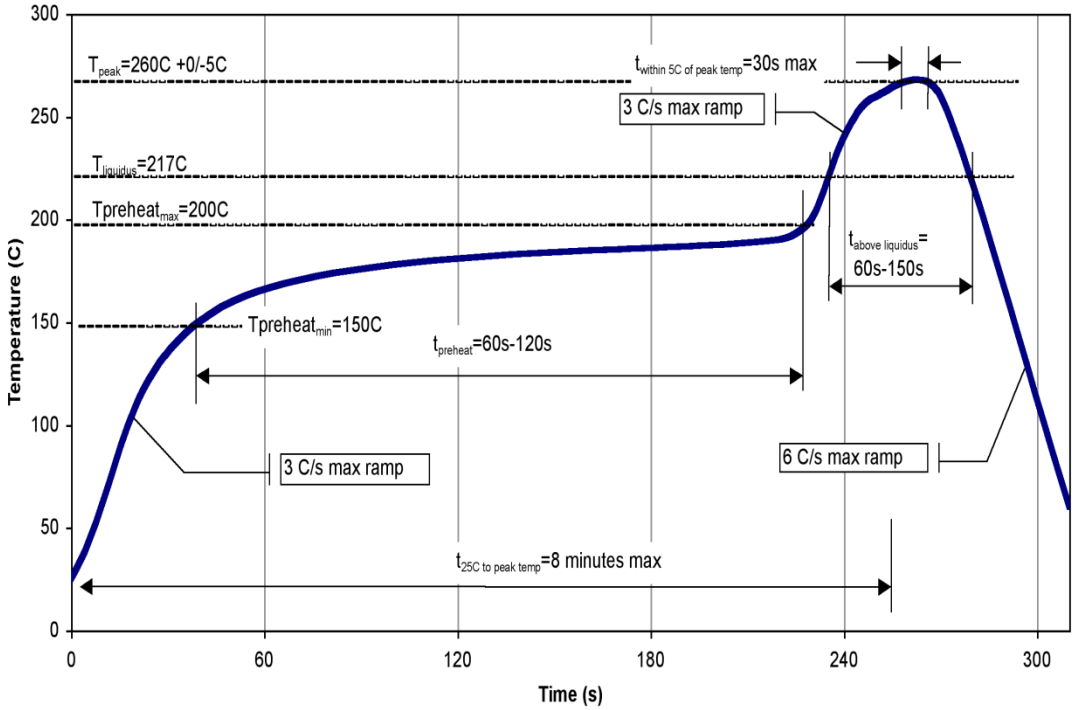
Mechanical Information & Package Marking



NOTES:
1. MATERIAL:
   - PACKAGE BASE: CERAMIC
   - PACKAGE LID: PLASTIC
   - ALL METALIZED FEATURES ARE GOLD PLATED.
   - PART IS EPOXY SEALED.
2. PART MARKING:
   2205 - PART NUMBER
   YY - PART NUMBER YEAR
   WW - PART ASSEMBLY WEEK
   MXXX - BATCH ID

Dimensions Units: millimeters (mm)
Tolerances:
.xx = ±0.25
.xxx = ±0.100

Recommended Soldering Profile



Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 2	ESDA / JEDEC JS-001-2012
ESD – Charged Device Model (CDM)	Class C3	JEDEC JESD22-C101
MSL – Moisture Sensitivity Level	TBD	IPC/JEDEC J-STD-020

Caution!
ESD-Sensitive Device

Solderability

Compatible with both lead-free (260°C max reflow temp.) and tin/lead (245°C max reflow temp.) soldering processes.

RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ($C_{15}H_{12}Br_4O_2$) Free
- PFOS Free
- SVHC Free

Contact Information

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